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EFFECT OF JOINT APPLICATION OF 2,4-D AND UREA ON WEED CONTROL IN RICE

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Abstract: In a field experiment to study the efficiency of joint broadcast application of herbicide 2,4-D and fertilizer urea as compared to spraying 2,4-D and broadcasting urea in two separate operations, it was observed that both these methods are similar in weed control and rice yield. However, in the joint application the sprayer is not needed and the spraying cost, human energy and time spent for spraying are saved.

Key words: Herbicide fertilizer mixture, rice weed control, weed control efficiency, weed index.

INTRODUCTION

Weed control is important in wetland rice and it constitutes the bulk of cultivation cost of rice. The important wetland weeds are *Echinochloa colonum* Link. and *Echinochloa crusgalli* Veauv. among grasses, *Cyperus difformis* Linn and *Fimbristylis miliaceae* (L.) Vahl. among sedges and *Monochoria vaginalis* Prest, *Ludwigia parviflora* Roxb, *Sphenoclea zeylanica* Gaertn, and *Marsilia quadrifoliata* Linn among broad leaved weeds. Most of the sedges and broad leaved weeds are very much sensitive to 2,4-D, the cheapest herbicide, available. The grasses at the younger stages are also found to be controlled by 2,4-D particularly with its ester formulations (Dc Datta and Laesiana, 1973). In general, 2-4 D is recommended to be sprayed three weeks after transplanting rice where broad leaved weeds and sedges are dominant weeds. This time of application of 2,4-D coincides with the first top dressing, when fertilizer nitrogen is applied in three splits to rice. A joint broadcast application after a thorough physical coating of 2,4-D on urea is thought to have several advantages including saving of time, cost and energy.

MATERIALS AND METHODS

The experiment was laid out in randomised block design with three replications in the additional crop season (May to September) at the Rice Research Station, Moncompu, Kerala. Twenty one day old rice seedlings (variety Jyothi, 110 day duration) was transplanted at 20 x 10 cm spacing in well puddled soil. Nitrogen 70 kg ha^{-1} was applied as urea in three splits, half as basal, one fourth at 20 days and rest at 50 days after transplanting. Phosphorus (35 kg ha^{-1}) as rock phosphate was applied basally. Potassium (35 kg ha^{-1}) as muriate of potash was applied in two equal doses, one basal and the other at 50 days after transplanting. The weed control treatments tested are given in Table 1. The 2,4-D formulatioas tested were Fernoxone (sodium salt of 2,4-D 80% ae W/W) and Weedone (ethyl ester of 2,4-D 18% ae W/W). In treatment no. 1, Fernoxone was sprayed in 400 litres of water per ha at 20 days after transplanting (DAT) while in other herbicide treatments, the required quantity of herbicide was physically mixed with urea required for the first top dressing (38 kg ha^{-1}) and applied on the same day. Sampling *on* weed population prior to treatment application showed a similar distribution of 20%) grasses, 45% sedges and 35% broad leaved weeds in all plots. Dry weight of weeds was recorded at 20, 40 and 60 days after application of treatments. Weed control efficiency at 80 days after transplanting and weed index at harvest were estimated as suggested by Rao *et al.* (1976) and Gill and Vijayakumar (1969) respectively. Observations on N loss caused by weeds, yield and yield attributing characters were made according to standard procedures.

RESULTS AND DISCUSSION

Between hand weeding and 2,4-D treatments applied at highest dose of 1.0 kg ha^{-1} irres-

Table 1. Weed and crop parameters as affected hy form and method of application of 2,4-D

Sl No.	Treatments	Dry weight of weeds, kg ha^{-1}			N uptake by weeds	Weed control efficiency (%)	Productive tillers/ hill	1000 grain wt, g	Grain yield, t ha^{-1}	Straw yield, t ha^{-1}	Weed index
		40 DAT	60 DAT	80 DAT							
1	2,4-D sodium salt 1.0 kg ae ha^{-1} sprayed and urea top dressed	124	323	517	5.0	67	8.3	28.3	4.3	5.3	7
2	2,4-D *sodium* salt 0.6 kg ae ha^{-1} mixed with urea and top dressed	301	523	752	6.7	46	7.5	27.3	3.3	4.7	23
3	2,4-D sodium salt 0.8 kg ae ha^{-1} mixed urea and top dressed	207	488	662	6.2	55	7.6	27.7	3.9	5.2	16
4	2,4-D sodium salt 1.0 kg ae ha^{-1} mixed with urea and top dressed	126	346	482	4.8	69	8.5	28.4	4.4	5.4	6
5	2,4-D ethyl ester 0.6 kg ae ha^{-1} mixed with urea and top dressed	264	538	665	6.2	50	7.4	27.0	3.5	4.8	25
6	2,4-D ethyl ester 0.8 kg ae ha^{-1} mixed with urea and top dressed	266	532	750	7.0	48	7.1	27.5	3.5	4.8	23
7	2,4-D ethyl ester 1.0 kg ae ha^{-1} mixed with urea and top dressed	158	479	641	6.0	57	7.4	27.9	4.2	5.0	9
8	Hand weeding twice (urea top dressed)	112	55	212	2.0	73	8.9	28.6	4.6	5.6	0
9	Unweeded control (urea top dressed)	446	1194	127	11.6	-	5.9	26.6	2.8	4.0	39
	CD(0.05)	53	118	94	0.3	-	0.7	0.4	0.4	0.4	-

pective of its method of application, there was no significant difference in weed dry matter 20 days after herbicide application (i.e., 40 DAT). However, during 40 and 60 days after the herbicide application the weed dry matter in hand weeded treatment was significantly lower than in all other treatments (Table 1). Hand or chemically weeded treatments **significantly** reduced N loss through weeds, the least loss being in hand weeded plots. Among the two formulations, there was no significant difference in weed control and crop performance. The weed control efficiencies of Fernoxone and Weedone at higher rate mixed with urea were 69 and 57, respectively. Joint application of urea and Fernoxone at 1.25 kg ha^{-1} proved as effective as spraying the same amount of Fernoxone and top dressing urea separately. Weed control efficiency of these treatments was slightly lower than hand weeding. Dickinson and Carpenter (1977), observed that liquid form of 2,4-D at 1 kg ae ha ' mixed with urea and top dressed in rice gave complete weed control.

The effect of weed control treatments was significant on yield attributing characters viz., productive tillers per hill and 1000 grain weight which in turn affected grain yield. The highest grain yield (4.6 t ha^{-1}) was obtained in hand weeded plots owing to higher number of productive tillers and 1000 grain weight. However, these were similar to Fernoxone applied at 1.25 kg ha^{-1} either jointly with urea or sprayed separately. Thus the joint application saved the spraying cost but achieved similar weed control efficiency and yield. This is specially important in places like

Kerala where labour cost is very high. Besides, it requires clear weather and skilled labourers for spraying. Frequent rain during crop season, interferes with spraying at critical stages of weed control.

Though there was difference in weed control efficiency of Weedone and Fernoxone applied at highest rates, its effect on final grain and straw yield was similar. However, the weedicide cost was slightly higher in the case of Weedone.

Weed index which measures the relative reduction in yield in a treatment compared to the hand weeded treatment showed similar values for Fernoxone and Weedone applied at higher rates irrespective of application methods. The highest weed index was observed in the unweeded plot due to heavy weed infestation and consequent low yield. The very close weed indices for joint and individual application of 2,4-D agree with the similar weed control efficiencies observed in these treatments.

Joint application of the herbicide 2,4-D and fertilizer urea resulted in efficient and economic weed control in transplanted rice. This saves considerable amount of money incurred in hand weeding. The sprayer which a small fanner can hardly afford to is not needed and the spraying cost, human energy and time spent for spraying are also saved by this method. Though equally effective, the cheaper sodium salt form of 2,4-D is to be preferred to the ester form.

REFERENCES

De Datta, S.K. and Laesiana, R.Q. 1973. New herbicides, plant growth regulators and techniques for weed control. Paper presented at the Eleventh British Weed Control Conference 1972. *PANS* 19(2) : 248-249

Dickinson, L. and Carpenter, A.J. 1977. Home made granular formulations for applying chemicals to irrigated rice. *PANS* 23(2) : 234-235

Gill, G.S. and Vijayakumar. 1969. Weed index - A new method for reporting weed control trials. *India J. Agron.* 16 : 96-98

Rao, M.V., Dubey, A.N. and Manna, G.B. 1976. Probability of existence of pre-emergence herbicide: Moisture-variety interaction adverse to direct seeded rice on uplands. *Indian J. WeedSci.* 8(1) : 22-31